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THE UNIX NEWSLETTER

VOLUME 5 NUMBER 2

FEBRUARY 1980

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BOARD MEETING

The Board of Directors met in Boulder on February 1, 1980. They approved the election schedule below and the site selected for the June meeting as well as the registration procedures and fees.

The Board also approved the bilateral agreements with the UK and Australia UNIX-related groups.

DELAWARE MEETING

The next meeting of the Usenix Association will be held at the University of Delaware, June 17 through June 20, 1980. Please read the two page letter from Ed Szurkowski for details.

BOULDER MEETING

Martin Tuori, Gregory Hill, and Ian Johnstone are owed a debt of gratitude by all of us for their notes on the Boulder meeting. They volunteered to take minutes when we discovered in real-time at the first session that none of us had arranged for reporters in advance.

V7 BUG FIX

There is a bug fix to the Version 7 ht-driver to prevent a job from getting hung when writing past the end of a tape. Insert the following line immediately after the label "next:" in procedure htstart(...) of Module /usr/sys/dev/ht.c:

```
htab.b active = 0;
```

ELECTIONS

The timetable for election of officers is as follows:

March 1, 1980	Notice of Elections and Nomination Ballots Mailed
April 1, 1980	Nomination Ballots Counted
April 15, 1980	Election Ballots Mailed by Secretary
May 15, 1980	Last Date for Postmark on Election Ballots
June 1, 1980	Ballots Counted

This schedule will allow the installation of the new Board of Directors and Officers at the Delaware meeting.

Nominating ballots were mailed on February 28 to all members on that date and are being mailed to new members as soon as membership applications are received up until April 1, 1980.

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February 25, 1980

Dr. Mel Perentz
Box 8
The Rockefeller University
1230 York Avenue
New York, NY 10021

Dear Mel:

As I promised, here's a few of the details about the June 1980 Usenix meeting.

The meeting will be held here at the University of Delaware from Tuesday, June 17 through Friday, June 20. I spoke briefly with Debbie Scherrer at the Boulder meeting, and she agreed that the Software Tools Users Group Conference would also be held here on Monday, June 16. All meetings will be held in John M. Clayton Hall, the University's conference center.

The tentative plan is to have 3 sessions per day, with the following daily schedule:

9:00 a.m. to 10:30 a.m.	Morning Session, Part 1
10:30 a.m. to 11:00 a.m.	Coffee Break
11:00 a.m. to 12:30 p.m.	Morning Session, Part 2
12:30 p.m. to 2:30 p.m.	Lunch and Informal Discussions
2:30 p.m. to 4:30 p.m.	Afternoon Session
4:30 p.m. to 7:30 p.m.	Dinner Break
7:30 p.m. to 9:00 p.m.	Evening Session

Dan Grim from our Computing Center has agreed to serve as program chairman, and I have given him the names of the people that expressed to me an interest in serving on the programming committee. He will be contacting these folks shortly, and he asks that anyone else who would like to help please contact him as soon as possible at the address given below.

Dan agrees that there should be a special session for vendors making product presentations. The exact ground rules for this haven't been completely worked out as yet, but there will be a charge for those people that speak during this session. As you suggested, the fee will be \$100 per 15 minutes, with institutional members of Usenix getting the first 15 minutes free.

Dr. Mel Perentz
Page Two
February 25, 1980

We have arranged to provide housing for approximately 500 people in the high-rise student apartment buildings that are adjacent to Clayton Hall. In order for us to be able to provide accommodations for everyone that desires them, it is very important that people preregister as soon as they receive the materials. It will be very difficult for us to provide a room for folks who just show up at the meeting without any advance notice.

Since there seemed to be a good deal of support for the idea at Boulder, we will be trying to put together an informal mini-proceedings to be distributed to the registrants at the meeting. In addition, we presume that members who are unable to attend will be able to get a copy through the Usenix committee after the conference. For this initial attempt at a publication, we are encouraging participants, particularly those that will give presentations, to prepare some written material (with illustrations if desired) about topics of interest to the Unix community, and bring it to the meeting in camera-ready form. Any papers received at the conference site by 3:00 p.m. on Tuesday, June 17 will be reproduced, spiral bound, and distributed on Friday, the last day of the conference. We're hoping that the proceedings will eliminate the rush for copies brought by individual speakers, and assure that everyone gets a copy of all the papers. Details on the mechanics of preparing submissions will accompany the registration forms.

That's about all I have for now; we'll have final details in the registration and information packets. If anyone has any suggestions about things they would or would not like to see at the June meeting, they should contact Dan or myself as soon as possible. Thanks.

Sincerely,



Ed Szurkowski

as

cc: P. Warter
Dan Grim
David Bartley, Clayton Hall
Lou Katz
Debbie Scherrer

Dan Grim's address for program committee:

Dan Grim, Computing Center, University of Delaware, Newark, DE 19

THE BOULDER SOFTWARE TOOLS AND USENIX MEETINGS IN SUMMARY

SOFTWARE TOOLS and USENIX Meetings
Boulder, Colorado
January 28 - February 2, 1980

This report is a summary of two winter meetings held in Boulder.

It is based on notes and memories of the attendees listed below, and as such reflects our personal biases and knowledge. Extensive detail has been deliberately avoided, in the hope of keeping these notes down to a reasonable size.

In general, there is a rapid growth in the size of both these users groups; there were 450 attendees at the USENIX meeting, which is the largest attendance yet. For the Software tools group this is apparent in sheer numbers, as well as in the formation of SIG's to deal with issues in specific subject matter areas and geographic regions. There is a strong cooperative attitude within this community, which will soon result in two new software distributions, and an informal UNIX network for mail and news. We have also noted a trend towards more formal reporting of technical information. The next USENIX meeting will publish a proceedings, and individuals are encouraged to send in short articles for publication in the newsletters. It is important that reviews of bug fixes, performance considerations, and available software be produced periodically, to help fill the growing gap between experienced hacks and new users.

We cannot guarantee that what is reported here was actually said. If you want to be SURE, or need more information, check with the speaker in question. Our apologies to anyone who has been misquoted.

Our thanks to the many persons who made informative presentations at the meetings. Further thanks to David Sherman, whose notes and macros from last June's conference made easy the production of these notes.

February 5, 1980

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SOFTWARE TOOLS USERS GROUP MEETING
TUESDAY MORNING
 Chair: Debbie Scherrer, Lawrence Berkeley Laboratory

Speaker 1 9:00 a.m.**Opening Remarks**

Debbie Scherrer
 Lawrence Berkeley Laboratory

Debbie introduced this meeting by giving a very brief history of the Software Tools development. The book 'Software Tools', by Kernighan and Plauger sparked the group; at the same time Addison and Wesley made available a tape containing the source for the tools described in the book, for the princely sum of \$25. So far, about 800 tapes have been sold. This is the second meeting of the Software Tools Users Group.

Speaker 2 9:05 a.m.**Enhanced Tools**

Allen Akin
 Georgia Institute of Technology

Allen described their ring network of 4 PRIME computers, running the Primos IV OS. This configuration has been up for about 3 years, and has a user community of about 150, from secretaries to researchers. They have modified many of the tools, including a shell which supports multiple inputs and outputs, for network applications. They have written STACC (Still Another Compiler-Compiler), and with it have rewritten Ratfor, to allow extensions including recursion in internal procedures. They have been very active and have created many new and useful tools. Their package is available to PRIME users for \$1000 for the first year, \$1000 a year thereafter (schools less 30%). However, some of their tools are free, and have been submitted to the users group. At this time PRIME UK and PRIME Australia are distributing this package.

Speaker 3 9:30 a.m.**Heterogeneous Networking**

Joe Svemek
 Lawrence Berkeley Laboratory

The problem with which LBL has been faced is to connect different machines in such a way that users could work across the network. This should include not just mail, virtual terminal access, and file transfers, but full resource sharing. User support is required at two levels: at the command level, standard utilities should be available throughout the network; at the programming level, a single set of system calls and primitives within Ratfor should be available throughout the network. This creates a virtual operating system which can be overlaid on any host in a network, in which system services (utilities and system calls) are consistent. So far this has been implemented under VMS, RSX, UNIX, and TENEX.

A complete set of primitives might include:

File I/O: open, close, create, getline, putline, getchar, putchar,
prompt, remove, amove, rawmode.

Directory control: chdir, print-working-dir, opendir, closedir,
get-dir-params, mkdir, rmdir, mvdir

Processes: spawn, kill, suspend, resume, pstat, pwait

Speaker 4 10:00 a.m.

Standardized Primitives

Skip Egdorf
Consultant to
U.S. Geological Survey
National Earthquake Information Service

Skip has been using Ratfor to produce applications packages for the study and monitoring of earthquakes. Since the projects have moved to a new machine about once every two years, a strong portable base was needed. Ratfor was chosen for just that reason; but it needs strengthened portability/standardization in its system primitives. He suggested the following set:

I/O: getchar, putchar, getline, putline, readf, writf,
read(binary), writb, read(string), writes.

File System: open, close, create, remove, seek, mark,
mkdir, rmdir

Processes: getarg, spawn, suspend
String Manipulation: pack, unpack

Skip asked for comment and discussion within the users group, so that a single set of extended primitives might be developed.

---- BREAK ----

Speaker 5 10:45 a.m.

Naval Ocean Systems Center

Bob Calland
Naval Ocean Systems Center

Bob described their primary use of the tools, the development of large single stand alone programs for on-board mini's. To do this, they have developed the necessary cross-compiler, assembler, loader, etc. Their targets include a military micro, the AN/UUK-20, and the CMS2.

Speaker 6 11:15 a.m.

Portable Crystallography Software

Jim Stewart
University of Maryland

This was one of the more entertaining talks. Jim is a chemist, whose interest in software is summarized by 'Kernighan's 3rd Principle': 'Let someone else do the hard part.' He and Robert Munn

have developed applications in crystallography, based on an improved Ratfor with a macro preprocessor -- RATMAC. Jim outlined his own evolution from hand calculation, through unit record equipment, Fortran 2, Fortran 4, to Ratfor. He sees Fortran 77 as another opportunity to rewrite all existing software -- an opportunity which he would like to decline.

Their efforts have enabled them to port their software to a large number of different systems; it is available for \$100 from

Computer Science Center
University of Maryland
College Park, Maryland 20742
attn: Dr. R. Munn

or send a letter to receive a copy of the RATMAC primer.

Speaker 7 11:45 a.m.

Maintaining TELCO Software

Dick McLaughlin
Bell Labs

Dick described EPLANS (Engineering, Planning and Analysis Software) - a collection of programs which are used to handle the implementation and support of telephone switching networks. This represents some 30 programs, or 40,000 lines of Fortran code, which is being converted to Ratfor. This software is in use by Western Electric, Bell Canada, and independent Telephone Companies. Their experience has shown that an applications programmer faced with understanding and supporting a 9000 line Fortran program could spend 18 months, and not be able to modify the program without assistance from the authors; on the other hand, the same programmer could be up to speed within a month, working on the same program in Ratfor. Their target systems include MVS/TSO, VM/CMS, DEC System10, GCOS, UNIVAC, XEROX, and UNIX-VAX. In the future, they are looking toward EFL (Extended Fortran Language), which will allow extended data and control structures, a full compiler (not just the preprocessor), and in general a superset of Ratfor.

---- LUNCH ----

Speaker 8 1:30 p.m.

5 -- Stats System

Rick Becker
Bell Labs

Rick described the 'S' statistical analysis system, which he says is easy to use, powerful, extensible, and portable. He emphasized that it allows a statistician to 'come in contact' with his data, through an interpretive expression language, like APL, but using functions rather than operators.

e.g. $r < \dots \text{regress}(x,y)$

S was developed using Ratfor, M4, YACC, STRUCT, and an interface language. (STRUCT takes Fortran and tries to turn it into Ratfor).

Rick went on to indicate the problems involved in moving S to another system: the supporting tools would need to be ported; there would be OS dependencies to consider; there might be conflicts with other tools; and programmers would be required to adapt. S as currently implemented requires that all its database be in main memory -- this is a problem on the 11/70, but not on the VAX. Some consideration is being given to allowing analyses to operate sequentially, where appropriate. It works

well at this time on small to medium data sets.

S is based on the GRZ Graphics Package, which is not yet available outside the Bell System. It is, however, their intention to release S at some time.

Speaker 9 1:00 p.m.

ALDS -- Statistics Package

Jan Lewis
Battelle (Pacific Northwest Labs)

Jan described the research efforts going on at Battelle; they have a computer lab environment for testing and implementing ideas on the handling of large data sets. The work will be carried out on a VAX, with RAMTEK colour displays; the general requirements are that the ALDS system be data-directed, iterative (action at a given step depends on the results of prior phases of analysis), interactive, and graphics-intensive. They need to get up and running soon, so they expect to develop an operational system which may be discarded later. They would prefer to develop something which can be extended and modified.

The system will be extended to include Database research, using a standard file format called a self-descriptive binary, or SDB file. It is intended that ALDS will form an "operating system" in its own right, with three main components: statistics, graphics, and database. To this end, work will be carried out to evaluate the relative merits of command versus menu-driven user interfaces. User interface tools will be developed, so that the style of user interface can be changed, without major change to the software application packages themselves.

This software will likely all be in the public domain, although specific target date has been chosen for completion.

Speaker 10 2:20 p.m.

Publication of Algorithms

Webb Miller
ACM Algorithms Editor
University of California, Santa Barbara

Webb reviewed some of the history of algorithm development and reporting (1960-1980), and indicated several trends. Where Algol used to be the preferred vehicle for algorithm publishing, Fortran is now much more prevalent. The ratio of numerical to combinatorial algorithms has varied, but remains on the order of five/ten to one. The length of algorithms published has increased, so that they are now commonly in excess of 1000 lines of source.

Earlier work in the programming field has led to the standardization and development of useful software packages, including EISPACK (eigenvector software), NAG (numerical algorithms group), and IMSL (International Math and Stats Lib). Webb then suggested that these same program development philosophies are applicable to non-numeric software, and that Software Tools users SHOULD publish their algorithms, both for the sake of the community, and for their own accreditation. Suitable journals include Communications of the ACM, Transactions on Mathematical Software, and TOPLAS.

He went on to describe TOOLPACK, a prototype environment for the development, testing, analysis, and verification of mathematical software. It includes a Fortran-intelligent editor, but still needs a structure to convert from C into Ratfor, EFL, SFran3, Fortran 77 (any or all). For a "TOOLPACK

Prospectus", write

Dr. Wayne Cowell
Applied Mathematics Division
Bldg. 221
Argonne National Labs
Argonne, Illinois 60439
(312) 972-7164

.... BRL 4K

Speaker 11 3:00 p.m.

NEW Basic Software Tools Tape

Debbie Scherrer
Lawrence Berkeley Laboratory

Debbie indicated that they have been involved in a teleconference group, trying to establish a new standard collection of tools. There has been strong participation from LBL, Georgia Inst. of Technology, University of Arizona, and others. The result should be a three part tape, to be distributed by the U of A. sometime in the next 6 months. For a piece of software to be included, it must satisfy the following:

- acceptable to the users group and/or the teleconference group
- adequately documented
- should be written using the basic primitives, or use well-documented local primitives
- be runnable under the Addison-Wesley Ratfor package
- be runnable at GIT, LBL, and UofA with few/no changes.
(other volunteer sites are welcome)

PART1: the contents of the Addison-Wesley tape, and other portable, generally useful tools, including Ratfor and Macro preprocessors, editors, text handlers
PART2: additional tools, including alternate versions of tools in part 1, a shell command interpreter, mail, screen editors, tape archiver, virtual Libraries of primitives will be included to provide support for as many Computer + Operating System combinations as possible, maybe 30 or 40.
PART3: Member lists

In the future, good tools will be added to the tape, and moved up from PART2 to PART1. We'll be looking for Graphics, SCCS, make, and other goodies.

Speaker 12 3:30 p.m.

Special Interest Groups

Four informal SIGs have been formed, persons interested were invited to split off into separate areas to discuss plans and organizational details. Brief reports were solicited from these groups, as follows:

Text Processing SIG

All text tools will be included on the tape, the best in PART1, the rest in PART2

Networking SIG

A questionnaire will be distributed to members, asking for info on topologies and problems. The goal of

the SIG is a common command language, consistent across heterogeneous networks.

Pommes SIG

This SIG will attempt to layer the present superset of primitives which have been suggested. It is acknowledged that selecting a clean, yet complete set is as yet a black art, about which we need to learn much more.

RATFOR SIG

A committee was formed to select a chairperson, and evaluate the 3 Ratfor Preprocessors which have been offered. One will be selected for PART I of the new tools tape, the others will presumably be included in PART 2.

SOFTWARE TOOLS USERS GROUP NEWSLETTER

Neil Groundwater volunteered to handle the newsletter for the time being.

Neil Groundwater
Analytic Disciplines Inc.
8320 Old Courthouse Road
Vienna, VA 22180
(703) 893-6140

USENIX MEETING WEDNESDAY JANUARY 30 MORNING SESSION Chairperson -- Mike O'Dell

Speaker 1

Opening Comments

John Donnelly
NCAR

John introduced a new device, 'dev/snare', and welcomed us to the Boulder USENIX meeting. The conference was held in a theatre near the Harvest Hilton. This was necessary since 450 attended. There was a question as to whether it was merely coincidence that 'Black Hole' was showing at the time.

Speaker 2

Converting to UNIX

Brad Cox
Hendrix Electronics

Hendrix produces text-handling equipment, the Chicago Tribune is one of their large customers -- their shop contains 6 PDP-10's, 30 PDP-11/34's, and hundreds of TI 9900's based intelligent terminals. Brad outlined some of the problems and internal conflicts which arose in converting their central software development facility from RSTS to UNIX, assembler to C and Pascal. This conflict sounded typical of so many other conversions. In answer to a question concerning the possibility of general guidelines for such a conversion, Brad suggested that system support people work to set clear and powerful examples of UNIX's power and productivity.

Speaker 3

New Products from Yourdon

Mark Pearson
Yourdon Inc.

Mark mentioned four product areas from Yourdon.

Yourdon has a C compiler for RSX-11M, VAX native mode, and IBM systems. The price is \$2500 1st cpu, \$500 next -- for source, future versions may be released for the DEC 10, and the Western Digital Pascal machine.

OMNIX is a Z80-based system which supports pipes, I/O redirection, a shell, but no C compiler yet. It is NOT a UNIX, but is similar. It is multi-user, and supports a UNIX filesystem. It can run CP/M binaries, as it supports the CP/M system calls. It handles a range of peripherals, and sells for \$350.

Yourdon now offers a supported binary UNIX/V6 licence, single user on an 11/23 with RL01's, for \$2500. They have one of the new WL licenses which relates the royalties they pay to the size of the systems they licence.

They also have a queued spooling system for UNIX's, \$1000.

---- BREAK ----

Speaker 4

News from Intermetrics

Morris Kranc
Intermetrics

Intermetrics is a software house; they use PWB/UNIX. TSO has effectively been replaced by using PWB (ed, scs, make) + RJE. They have encountered problems with RJE to an Amdahl 470. A document describing the problems will be included in the next tape distribution.

Intermetrics is acting as the sole US distributor for the Amsterdam Pascal Compiler.

They also have an improved UNIX accounting package, done entirely in the shell; it will be included in the upcoming software distribution tape #4.

Speaker 5

UNIX at Fujitsu

Yoshiaki Hiratsuka
Fujitsu Laboratories

As a result of problems with RK05 disks attached to their 11/45 running UNIX/PWB Fujitsu has developed a reliable disc system, the 40MB PF6032. It performs hardware level substitution of alternates for bad cylinders.

They have a LISP implementation running on their UNIX. It has no floating point support, and integers are +-32768. It supports 7000 free cells, and up to 200 literal atoms.

Their future plans for using UNIX are to port UNIX to new machines, including the M series (large) and the PF1500 (mini).

Speaker 6

News from BBN

Ben Woznick
Bolt, Beranek and Newman, Inc.

BBN runs a research environment, with a number of machines running a number of operating systems. In this kind of a mixed environment, the text editor can be a major problem, so they have developed a new screen editor. They also have a message facility amongst their systems. The "C machine" described last June is within design objectives; it now runs C programs, but not yet a full UNIX. They are currently bringing up ARPANET MCP code.

BBN is looking at issues in the remote maintenance of software, and developing a distributed UNIX system which will operate within a broadcast heterogeneous network. They have a UNIX-based network control center and network services manager for APRA-like networks, and are now offering

installation and support services on UNIX systems.

They are getting started on a C compiler for the Motorola M68000, and on converting the real-time O.S. "MAUS" to C for LSI-11's.

Speaker 7

News from DEC

Bill Munson
Digital Equipment Corp.

Bill is Senior Engineering Manager for the Telephone and Utilities Group at DEC. He described himself informally as a pseudo-product manager for UNIX (DEC doesn't distribute UNIX yet). He describes his function, in part, as trying to understand UNIX, so that he can pass on information within DEC and to customers. He hopes that DEC can avoid products which do not work well at UNIX sites, such as the PDP-11/60, PDP11/44, RL01's RK06/7's. He wants to ensure that UNIX migrates smoothly from the 11 to the VAX, and that users will be able to get the hardware info they need to be able to fully utilize that machine. He assured the audience that as new products are introduced, they will be field tested at UNIX sites -- probably Bell Labs. Field support at DEC is being provided with info about UNIX so that hardware maintenance and UNIX software types can coexist.

DEC has several UNIX licenses, so they are able to study UNIX, and interactions with future hardware products. The main interest is in UNIX for the VAX since DEC already has enough OSs for the PDP11. DEC this year is spending more on UNIX than RSX11-M. DEC is working on a C compiler for VMS, as well as putting in some PWB features. VMS may even get bits written in C. The proposition that UNIX would lose its popularity if supported by DEC was put forward, since one of its main attractions is lack of manufacturer support. He said at one point, "People [outside the UNIX community] don't understand how easy it is to do things under UNIX". and "Watching people that are so damned productive is amazing".

DECUS U.S. is almost certain to grant permission for a UNIX SIG; Mark Bartelt is coordinating this effort. DECUS CANADA and DECUS UK already have UNIX SIGs.

Speaker 8

Distributed Ring Network

Bruce Walker
UCLA

UCLA is doing network research, funded by ARPA, they have an ARPANET MCP program for UNIX, and are now working on a 6 system (11/45, 11/34 and VAX) ring network (8Mb/sec). The ring hardware is similar to that used at Irvine, MIT, and Logicon. At least two of the systems share a dual-port disc, and the network has access to an ARPA imp connection. The overall goals of the project are:

- network wide filesystem
- recovery software
- network inter-process communication
- distributed process families
- distributed database support

To enable the network wide filesystem, they intend to implement a global name space. Rather than base this on the syntax '/systemname/pathname', or '@systemname/pathname', they will be keeping 'filesystemname/pathname'. Thus a file has the same full name when viewed from any UNIX system. Filesystems will be replicated on different machines, by storing local copies of the inode list, and any

files in use. Updates will then be propagated around the net. Files will be brought into a system on a demand paging basis; some of the machines on the net may have no disc of their own, so pages will be brought in at ring speed, much like a disc driver would, using the system's buffer cache. Other issues to be considered are atomicity of file actions, synchronization, exclusive access, and recovery procedures.

----- LUNCH -----

WEDNESDAY JANUARY 30 AFTERNOON SESSION

Chairperson -- Don Ladernann

Speaker 9

News From Western Electric

Al Arms
Western Electric Co.

Al began by expressing surprise at the rate of growth of Users Group, and indicating that his purpose at these meetings is to answer questions, squelch rumours, and announce new products from Bell Labs and Western Electric. He indicated that the question of WEC's continuing to license software has been answered, for the time being. A recent decision was reached that software licensing is compatible with the Bell system's consent decree; so they will continue in the same fashion that they have in the past. The key appears to be that no support is offered and that the software represents merely a snapshot of a system in use at BTL.

Al expressed the hope that by 1985 the group will reach critical mass, collapse into a black hole, and finally suck in all existing card readers and punches.

There have been no new products since June 79, although some licensing changes have occurred. It is now possible to obtain a small business system CPU binary licence, which is based on the number of terminals supported, sliding from \$750 to \$9600. Bulk agreements can be arranged as well. A collection of popular PWB tools can be licensed in object form, including SCCS, for \$3000 (\$2500 subsequent).

Al then fielded a number of specific questions. UNIX tools can be ported to systems like RSTS only by licensing the target CPU for UNIX. Lint may be ported to PWB by adding a V7 licence to the PWB licence. PWB + V7 costs \$42,000 for first licences. Merit will not be released. Contractors who work on UNIX systems must sign a non-disclosure agreement, or be licensed for the software products in use. UNIX-TS and UNIX-RT (Bell Labs' own internal versions) will probably not be released. LEX will not be released. WEC will try to release the Equipment Test Package that Bell Labs has for hardware testing. The kernel and utilities will not be licensed separately, since WEC is constrained in the way it operates, to sell 'as is'.

Speaker 10

UNIX on the Harris /6 mini

Bill Shannon
Case Western Reserve University

Bill described a project in which they ported UNIX V7 to the Harris /6 mini. He described details of the architecture of this machine, including the register sets, memory management, interrupt functions, and I/O. They encountered problems: the fundamental unit of addressability of memory is not a byte nor a word, types do not align to memory the same as they do on the 11, there is no stack facility in hardware, and the discs have an odd sector size. Nonetheless, they have V7 running on their 6/6's, in swapping mode, and plan to convert that to a paging system.

Speaker 11

UNIX on an IBM Series/1

Paul Jajcs
Cleveland State University

Paul described the Series/1 as a 16-bit mini, byte-addressable, with a reasonable instruction set, segmentation facility, and 8 stacks of segmentation registers. I/O is done through virtual addressing, there are some stack instructions, and the system has reasonable I/O gear. He indicated that IBM software was unusable. They did the porting without a PDP11. John Lion's UNIX commentary was most useful.

He went on to discuss some of the implementation decisions which were made along the way, and outlined the stages they went through in getting V7 up and running:

- obtained a cross compiler for C from U. of Delaware
- created a minimal UNIX filesystem on the system disc
- compiled and booted the UNIX kernel from the PDP 11, via a communications link
- debugging cycles
- port basic utilities to the Series/1
- port the C compiler to the new machine.

The implementation will be finished by next June.

----- BREAK -----

Speaker 12

News from ISC

Heinz Lycklama
Interactive Systems Corp.

ISC has a UNIX which runs under VAX/VMS, with most of the utilities. Heinz outlined some of systems and facilities ISC offers, including their own versions of mail, text formatting, screen editor, and a new device the 'UMC', which loosely resembles the KMC11. It can be used to turn char-at-a-time devices into DMA devices, the DZ11 terminal multiplexor is the classic example. Their VAX UNIX is a blend of V6 and PWB, and allows a smooth upward movement from the PDP 11. It also allows the use of DEC's EXL command language, and the shell interchangeably. It all seemed a little messy.

Speaker 13

UNIX Performance Considerations

David Mosher
Amper Corp. (formerly of Berkeley)

David's concern has been with the development of tools for the evaluation of system performance, and determination of full system capacity. His presentation was a good overview of the areas which have been considered for improving UNIX system performance. Although seasoned hackers may have found this to be 'old hat', those newer to the UNIX game were delighted to receive such a coherent guide to performance considerations.

Swapping Performance

Swapping behavior falls into 3 categories: no swapping, easy swapping, and hard swapping. If the load is light enough for there to be no swapping, process throughput times rise linearly with the number of simultaneous tasks. In the easy swap area, only processes which are non-runnable are swapped out, and the conflict for resources is still not too bad. Under hard swapping, the system may move runnable processes out in order to bring other runnable proc's in, but the proc's brought in may not actually run, for other reasons. By adding memory to the system, we can reduce or even eliminate swapping, with 1.5MBytes on an 11/70, performance is linear up to 40 users. David showed graphs in which he compared predicted performance with measured, before and after the addition of more memory. It was noted that the sudden rise in throughput time for a proc once hard swapping occurs has a large slope -- it is very nearly a wall! The swap algorithm can be softened somewhat by moving out large programs first.

The typical life of a process consists of:

fork and exec: which depend on the buffer cache, filesystem efficiency, and read-ahead

computation: depends on hardware cache memory, system overhead, and the scheduler efficiency.

I/O: depends on read-ahead and filesystem efficiency
exit:

Filesystem Performance

It has been noted that the inode cache doesn't work very well. Two techniques can be used to improve it. Inix can open /bin and /usr/bin to force those two inodes into the inode cache -- they will be used again and again. And schemes have been developed to use unwanted mode bits in the filesystem to indicate inodes which should be locked in the kernel.

The intent of block read-ahead is that when a block is read, the next block is read in preparation for its subsequent use. However, when the number of procs (or users or ports) is greater than half the number of buffers in the buffer cache, these read-aheads conflict and can result in a net deficit. Normally used blocks are put on the tail of the buffer cache; during a long exec, this flushes the entire cache. An improvement is to note that if the I/O aligns with the block boundary, put that block on the head of the cache -- it probably won't be referenced again, and can be reused. He claimed that the cache hit is 50-60%, or 1.5 blocks are read per seek to the disc. Note that keeping a filesystem 'linear' helps in this regard; this can be achieved by a complete dump and restore. A detailed discussion of optimal 'linear' layout can be found in the talk by Walt Lazear, Thursday morning session.

Suggested filesystem changes include keeping the root and tmp filesystems in core (costs memory and shifts the overheads), increasing the buffer cache, and extended buffer cache outside of kernel address space (eats up user memory and can introduce new overheads).

Processor Performance

Rescheduling is normally done when a proc blocks, or the clock says it time, and only in user mode. Thus the probability of a rescheduling = the prob. of being in user mode * the prob. of an event pending. Normally at 60hz, rescheduling occurs every second, by moving this up to 2 times or 10 times per second, a subjective improvement is noted, with 10 times per second somewhat better.

System Overhead

There is overhead involved in handling interrupts and system calls, with a minimum 320 microseconds to handle a system call. Terminal I/O is 90% output, only 10% input -- so pseudo DMA style drivers can be a big improvement, as can avoiding getc and putc. Wakeups in V6 are done through a linear search of the wakeup table, to its end. Noting the last used entry can trim this, and going to queues or a hashed lookup would be even better. SPL's exist in some places where they are not necessary, like in copyin and copyout, apparently to protect the supervisor registers. There was further info on this specific point in Dennis Ritchie's talk.

Speaker 14

IDRIS -- UNIX V6 lookalike

Mark Krieger
Whitesmiths, Ltd.

Whitesmiths has developed, from scratch, an operating system called IDRIS, which has the same system calls as UNIX (except Pirace), the same filesystem, and is supposed to be exactly bitwise (binary) compatible with UNIX. They will have it available in an LSI-11, non-memory management version by Mar 21/80, with memory management by June 80. At the meeting last June he made similar claims that it would be available now. The markets they hope to compete in include LSI-11's and -23's which might otherwise run RT11 or RSX, turnkey products with UNIX-like systems inside, and packaged micro systems. The IDRIS system will lack the full range of utilities for awhile, such as YACC, TROFF, etc.

Speaker 15

Contiguous Files in UNIX

Mitchell Gert
Amper Corp.

They have a technique for adding contiguous files to UNIX filesystems, in which a portion of a device is reserved for contiguous files, and the remainder is used for regular files. The motivation for this was a series of large image processing applications, in which a second port on the disc is used for transfers to and from hardware which isn't capable of deciphering the UNIX filesystem. Changes were required to mkfs, check programs, creat, stat, rm, open, close, write, etc. There were 7 changes to the kernel itself, each 2-15 lines. Plus the code to handle the files themselves.

Speaker 16

Performance Improvement: Large Buffers

Jeff Schriebman
Jeff Schriebman Consulting

By increasing the size of the buffer cache to 100-500KB, and always reading 1/4 or 1/2 track from the disc, improvement in I/O throughput can be obtained in the 9-40% range at a cost of 15% of the CPU.

This modification took 4 pages of code, and is transparent to utilities. It works in V6, and should do so in V7. It affects only reads, as it is essentially an extended read-ahead. Jeff has a brief paper describing the mod.

Speaker 17**Better Signal Management for IPC**

Paul Rubin
Advanced Business Communications, Inc.

UNIX application systems often need cooperating processes, one to provide operator control of a system, another to provide fast device control or run some computation. The traditional model is for one proc to write messages into a pipe or file, then signal the other proc, indicating that message(s) are waiting.

The problem arises that I/O is interruptible (non-atomic), and must be restarted following a signal catch. Vanilla UNIX allows signals only to be accepted or ignored; no delay or queuing of them is possible.

The solution Paul has developed is to add a 'pending' state to signals in UNIX. Thus 'signal(SIGINTUP, 1)' will give the signal a pending state. The call 'sigswait(fd, bitmask--of--signals)' will block until one of the signals indicated in the bitmask arrives, or return immediately a bitmask of pending signals, depending on the value of 'fd'.

This scheme allows for a more flexible and controlled handling of external events. It may be unnecessary with the advent of V7 multiplexed files.

THURSDAY JANUARY 31 MORNING SESSION

Chairpersons -- Lou Katz and Sam Leffler

Speaker 18**C and Pascal from Whitesmiths**

Mark Krieger
Whitesmiths, Ltd.

Whitesmiths has been involved in the production of C compilers and cross-compilers, for RSX, RSTS, RT11, the 780, and 8080. They now have a VAX native mode C compiler and loader, and a Pascal in C translator. They are working on compilers for the M68000, 8086 and 370. Each C compiler product includes a C library. The Pascal will not run with any C compiler, due to the way it handles struct members.

Speaker 19**UNIX on an Amdahl 470**

Gordon Kass
Amdahl Corp

Gordon described the efforts by which they have port'ed UNIX V6 to an Amdahl system. They did this without the help of a PDP-11 to lean on and bootstrap from. They proceeded by obtaining Bell's C/360 compiler, the PWB C compiler, to which they added 470 code tables and their own assembler. Then by writing I/O supervisor drivers, and converting utility programs, they were able to support a UNIX under VM, alongside CMS, MVS, SVS, etc. This is a V6 system with the PWB shell, C compiler, SCCS, make, accounting, full screen editor, RJE, and an automatic disc fixer. Because it happens within VM, VM commands are still available; their system is allocated 6MB of main memory and 19000MB of disc. The standard I/O library has been modified for efficiency improvements.

In the coming months they will be converting to V7, improving filesystem backup, adding formatting to support Amdahl document preparation, adding a debugger, C optimizer and networking. The software is not for sale, but if Amdahl customers are really keen on getting it, he suggested they ask their marketing rep's about it.

Speaker 20**Optimized Disc Freelist Layouts**

Walt Lazear
Air Force Data Service Center

Vanilla UNIX mkfs and lcheck -s build filesystem block freelists in a manner intended to optimize disc performance. Files will usually be allocated blocks sequentially from the freelist; and those blocks will be requested by the system in the same order. The first block is read, and following a fixed delay in the kernel, the second will be requested. If the freelist is structured to that the next block is allocated at the appropriate rotational distance, clean reads will result, with minimum rotational delay. The original scheme was based on an 11/40 running RPO3's and is not suitable for other systems. To perform a measure for a specific disc and cpu, one needs specs for the disc, and a time measurement from a modified copy command. By way of example, an 11/70 system which had been attaining only 1 block/disc revolution was improved to 3/revolution, thus accommodating 50% more users. Other factors include individual processor speed, hardware cache, memory interleaving, bus configuration, superbloc freelist size. Memory size, number of system buffers, number of mounted filesystems, user load and disc driver software are apparently not factors in this analysis (there is some disagreement on this point). Here are the magic numbers that Walt presented. Members of the audience suggested that they are conservative -- so try them out, but measure the results for your particular configuration. Also, these numbers do not apply directly to V7. The numbers are every-nth-block/sect-per-track.

DISC	34/35/40	44/45/60	70
RK05 J+F	3/24	3/24	2/24
RK05	5/24	4/24	3/24
RK06/7	9/66	7/66	5/66
RL01	8/40	7/40	4/40
RM02	13/32	10/32	7/32
RM03	20/32	15/32	10/32
RPO3	4/30	4/30	2/30
RPO4/5/6	14/22	11/22	7/22

RS03	10/16	8/16	5/16
RS04	19/32	15/32	10/32
RX01	1/6	1/6	1/6
RX02	1/13	1/13	1/13

Speaker 21

Interactive Process Control

Jim Kulp
I.I.A.S.A., Austria

Jim presented a number of problems which relate to the user's view of process initialization and control. The 'A' feature is permanent, allowing no further tty input; the '!' escape is not general, requires an extra process, and may not inherit environment properly. ps must be run for background status; zombies are a hassle; the user is forced to think of process id's, not job names. Ignored signals can actually cause a swap in first; multiple signals are a problem, and interrupts can't be masked, only ignored or accepted.

To solve some of these problems, he has developed a set of control commands, whose syntax is as follows:

```
.f (job) run job in foreground
.b (job) run job in background
.s (job) stop job
.l [-t] list jobs
.q (job) suppress asynchronous reporting (quiet)
.k (job) terminate (kill) job
control - (underscore) suspend foreground process
```

```
for example,          du lpr -2 >> file
takes too long to wait, so
<ctrl> -
STOPPED
% .j
i + STOPPED du lpr -2 >> file
% .b                  the job continues in background
etc.
```

In the facility, jobs are moved between foreground and background by changing their input/output from tty to /dev/null. Signals were changed to add sig-hold and sig-defer, which take signals and send them sig-hold, rather than the default. This code will be available in its V7 version.

Speaker 22

USENIX Announcements

Lou Katz
Columbia University

A 4th software distribution tape is being prepared; closing date for submissions is Feb 15, 1980. The tapes will be sent out about April, 1980, and will be sent to Institutional USENIX members. Arrangements have been made for interchange of tapes and newsletters with the UNIX user's Groups of the UK, Canada and Australia. There will be 10 newsletters coming out in 1980. USENIX elections

are coming up this spring, only Institutional members can cast ballots. The next USENIX meeting will be held at the University of Delaware, June 18-21, 1980. Proceedings will be published at that meeting, which should eliminate the need for detailed note-taking! Speakers should at least provide copies of their viewgraphs to the conference organizers. All material for publication should be camera-ready.

--- BREAK ---

Speaker 23

Port'ing C to a Word Addressable Machine

Sam Leffler
Case Western Reserve University

Sam describes his work as Yet Another Portable C Compiler; he has taken it to the Harris /6 mini, which he says is a very awkward machine with which to work (see Bill Shannon's talk, Wed afternoon). Pass 1 does all syntactic and semantic analysis; its intermediate language is expression trees. Machine dependent portions are translated, including all address offsets. The independent language is optimized. Pass 2 handles all other code generation. Expression trees are processed one by one, guided by a technique of estimating the number of registers used -- this is table driven. On the Harris /6 the registers are ugly (physically overlapping, some instructions imply register usage). There is no stack support, and pointers are inconsistent.

The project took 1-2 months of learning, 2-3 months of hard work.

Speaker 24

Software Testing

Bob Varney
Analytic Disciplines Inc.

ADI is working on programming of acoustic signal applications for the US Navy. There are several locations at which the work is being done, so they have set up procedures as an overall guide to software development. The basic concerns are software control, standard practices, and testing. All work is based on a 'Program Unit', which consists of documentation, source, test data input, test data output, and results analysis. These units are held online, and interactively updated. Static evaluation of programs is performed, and can be used in developing test cases.

Speaker 25

ANSI BASIC for UNIX

Chris Sturgess
Human Computing Resources Ltd.

Of the BASIC language processors available, ANSI BASIC is nearly a proper subset of the BASIC's supplied by micro vendors, and UNIX BASIC intersects with these only slightly. HCR has developed a BASIC which includes the features of ANSI and micro BASICs, with extensions. These include string handling, TEK 4012 Graphics, block structuring, a help command, chaining (for running series of programs), appending for loading subroutine libraries, and exec for allowing the use of shell commands from within BASIC. The product is intended for use in teaching, business, and personal computing.

As a load of 4 'user units' the swapping and paging systems performed similarly (computation bound), but by the time 16 units are running, the paged system runs twice as well.

Increasing the buffer size to 1KB improves performance of big jobs, at the cost of fairly complex kernel changes.

Increasing main memory improves performance overall, especially for giant LISP programs. Overall, changing from a small swap system to more memory, paging and big buffers gave an improvement of [33] down to 9:00 for a 12 job load.

Increasing the number of buffers in the buffer cache from 32 to 64 gave no net change to time required to run a test compile; BUT the total number of disc transfers was down 15%. It may not be noticeably faster, but it's easier on the disc.

The whole thing took about 1.5 man-years to do, shared between 2 people. This version of UNIX is being distributed; there are now about 12 sites running it. For info, contact

Keith Sklower
Computer Science Dept.
Evans Hall
University of California
Berkeley, California 94706

Speaker 32**A Moderate Office DB Management System**

David Tilbrook
Bell Northern Software Research

David described his "TIPS" system, which provides DBMS services on a scale between grep and INGRES. The system is based on a simple, standard method of text storage and output. It is currently has 30 users, and 70 databases, in the areas of data dictionaries, project management, bibliographies, correspondence, documentation, and telephone directories.

David suggested that TIPS' strengths were that it is based on simple text files, is small, easy to install, and requires no kernel modifications. He then admitted some weaknesses: it is slow at searching large bodies of info, it has no security beyond the UNIX filesystem (and no concurrency protection), is not quite fully bilingual (English/French -- it is partially), is based on and dependent on the QED editor, is not yet implemented using STDIO, and allows no nesting of structures.

A further strength, however, is that it is available to any UNIX site free -- it will be on the upcoming 4th software distribution tape.

Speaker 33**Key'ed I/O Mechanism for UNIX**

Bob Lunamis
Albert Einstein College

Bob has developed a key'ed I/O facility within UNIX, based on the facilities of the XEROX Sigma Series systems. The code will be sent for inclusion on the software distribution.

FRIDAY FEBRUARY 1, MORNING SESSION
Chairperson -- Wally Wedel

Speaker 34**An Enhanced Spelling Checker**

David James
Ampep Corp.

Under the V6 spelling check, the text is broken into words, run through a unique sort and merged with the dictionary, to find exceptions. David has extended this to include a hash between the sort and the merge. Thus when looking for a word, its hash is used to form a disc block number, and the correct section of the dictionary is retrieved in at most 1 seek. If the block is already in the local cache, no seek is required.

Some general problems in spelling checking include: stripping hyphenation, capitals, and suffixes. There are no universal rules for suffix stripping, but it is possible to store valid suffixes with each word in the dictionary. For interactive use, the spelling checker suggests alternates when it finds a bad word, will perform source file updating as it goes, provide continuous dictionary updating, and handle automatic corrections for common misspellings. David has a 38,000 word non-proprietary dictionary which will be made available (thus compares favourably with V7's 25,000 word dictionary). What he would like to collect is a list of typical misspellings of words, so that he can improve these techniques further.

Speaker 35**Image Processing**

Bob Gray
Pattern Analysis and Recognition Corp.

Bob described their problems in developing a software development facility. Their applications are state of the art, and as such are not easily specified; there are many persons implementing new software; these persons want to share and trade code; and the end users are not the persons now developing the code. The system they have features iterative enhancement, provides online menus and documentation, and allows other processors to be down-line loaded. It does this through a collection of 75 shell command files, which make extensive use of release numbers and updating. This ensures that there is always a working version of any application, and leaves more time for image processing development.

Speaker 36**3D Image Processing for Biology**

Noel Kruff
Columbia University, Biology Dept

Noel is using 3D vector graphics to study and model biological structures. This work finds application in the following areas:

- molecular modelling, protein structure and interaction

Speaker 26

New CULC FORTRAN IV PLUS

Robert Bradbury

Commercial Union Leasing Corp.

CULC's Fortran IV Plus is DEC compatible and MACRO-11 compatible. It comes with CULC's linker, and lib, and a converter from o files to obj files. It includes a UNIX system call library, and overlaying facilities. Recent improvements are an include statement, list directed I/O, the ability to mix C and Fortran, a compiler that runs 30% faster, and the code produced is 10% smaller, 15% faster than previous F4P compilers. There are 30 sites running this system, after 3 years on the market. There is minimal support on this product, for which binaries only are available; CULC customers must have a DEC Fortran IV Plus licence. This new version is now out, at \$7500 commercial, \$3500 educational, with a \$750 charge to upgrade to the new compiler.

Speaker 27

Running V7 on small PDP-11's

Bill Joltz

US Geological Survey

A number of changes to V7 were required to get it to run on the 11/34. The bootstrap program runs in two stages, it needs separate I&D, doesn't support some discs, and needs at least 64KB of memory. A partial rewrite was required. UNIX V7 itself is too big. By reducing items in the parameter list (say to 12 buffers, 40-50 inodes), and removing accounting from the kernel, it can be made smaller. The machine assist, m40.h, has some bugs, including incorrect stack setup, a KDSA6 reference, and failure to enter at boot through trap properly (see m70.s). The RL01 driver doesn't handle raw I/O properly, and on the 70 it needs to allocate the UNIBUS MAP, which it doesn't. User programs which use floating point need to be recompiled, and some utilities have a size problem, as expected. ADB, DD, and AWK can be made to fit non-separate I&D, but LEX and F77 will be more difficult. Overlays are available in two flavours -- contiguous overlays in which there is a root segment and several overlay segments which are selected by a call to an overlay subroutine, and V7 has an overlaying function itself.

V7 bugs include the following. On a heavily loaded system, an inode misaddressing causes it to miss the start of files being read. The clist, if too small will crash the system. Increasing its size alleviates this problem, but comments from the audience suggested that a size change only postpones the problem, it does not remove it. The CU program has its arguments in a call to ioctl reversed. In F77, longops routines use fixed point -- these can be changed to floating point.

Several persons promised to continue discussion of problems like these in subsequent issues of the USENIX newsletter.

.... LUNCH

THURSDAY, JANUARY 31, AFTERNOON SESSION

Chairperson -- Robert L. Cannon

Speaker 28

SEED Database System

Herb Edelstein

International Database Systems Inc.

Herb gave a description of the SEED Database System, which originally ran on a DEC 10, but now runs on ISC's UNIX. The product is claimed to be a portable CODASYL DBMS. It is based on ISC's Fortran compiler. The system addresses questions of security, storage management and concurrency. The price is \$9500 for a binary licence.

Speaker 29

Simplified DB Access: TACC and INGRES

Neil Groundwater

Analytic Disciplines Inc.

ADI is working with the US Navy on software development for a collection of Advanced Signal Processors, built by IBM. There are 35 of these in use, each containing as many as 100 modules. The units are carried in vehicles, reconfigured as necessary, and shipped from site to site. Keeping the operation reliable and maintainable is largely a problem of keeping track of the array processors and their maintenance histories.

The solution that ADI has implemented is referred to as 'Decision Network Processing'. The user moves through a hierarchy of menus, and need not be aware that there is a UNIX system underneath. Different persons' responsibilities can be reflected in the menu choices available to their accounts. At a primary level of hardware/software configuration info, grep is used to find and present info to the user. At a secondary level, more complex requests are handled through the 'equal' query program of INGRES. The menu facility is available to other sites.

Speaker 30

Coolab Interactive Environment

James Herriot

US Geological Survey

James described their efforts to develop a collection of tools to allow users to interact with their data, performing transformations and producing plotter output. The data with which they are working are sometimes as large as 100MB time series samples.

Speaker 31

Berkeley Virtual Memory UNIX V32

Bill Joy

University of California, Berkeley

Bill described the mechanisms by which demand paging has been added to UNIX V32 (the original Bell version was a swapping system). The changes include two system calls, and 15000 lines of code (7500 of which are comments). Measurements were performed, using a synthetic user load, to measure the differences in performance under swapping/paging. 512byte system buffers/1KB buffers, separate disc controllers, size of buffer cache, and quantity of main memory

- design of antibodies through recombinant DNA
- crystallography
- reconstruction of neural systems

To facilitate the last area, they have a laser scanner, called the 'ANT' (automatic nerve tracer), which allows them to look at images in a reasonable fashion. Noel showed slides of various examples of their work.

Speaker 37

Status of UNIX V7

Dennis Ritchie
Bell Labs

Dennis summarized the bugs which have been reported for V7, and emphasized that the Newsletter will be used for reporting any further bugs, and the fixes.

- 1) In low.s, the parity fault interrupt is set wrong, at 7 instead of 10.
- 2) In converting V6 filesystems to V7 with TAR, there is a sign extension problem in the stat routine.
- 3) when running an 11/70 with RP discs on the UNIBUS, the bootstrap doesn't set up the busmap. As well, the RP0J doesn't allocate the busmap.
- 4) wakeup() calls setrun() which recursively calls wakeup(). wakeup() should go back to the beginning of its list, rather than continuing from where it is.
- 5) ldiv, lrem, aldiv, alrem in libc perform long divisions wrong, as when dividing by 0100000.
- 6) adb displays floating point registers incorrectly (in the wrong order).
- 7) the tm tape driver has an incorrect define for the RLE bit.
- 8) the C optimizer can go into loops; this is known to happen for long compares.
- 9) locrl was written so as not to flush the input queue when switching tty modes. This can cause problems between normal and chreak modes. The simplest fix would be to force the input queue to flush.
- 10) the problem with a small cllt crashing the system may be related to the presence of the DZ11 driver, which seems to be a common feature in those sites which have reported this bug.
- 11) TUI6 and HT's can hang, with the interrupt never occurring. A timeout could be inserted to check for this type of condition.
- 12) the removal of sp5() in copying and copyout should be done with care, it may be needed on the smaller 11's which don't have the supervisor registers.
- 13) In relation to the PDP-11/44 not running UNIX properly, V7 does not use the extra register set, so there should be no problem.
- 14) test.c has a parenthesis problem; running lint -h on it will show it up.

Speaker 38

West Coast Users Group

John Bess
Onyx Systems

The West Coast Users Group is accepting applications from individuals for membership. It is open to those interested in the ideals of software development environments such as UNIX and Software Tools. Its general goals are to interchange technical information, with primary focus on activities which are in the public domain, and to foster interchanges between groups of users of proprietary packages. Newsletters will be published, containing short papers and letters to the editor. Regular features may be run as well, such as hardware and software reviews. This users group is looking for volunteers to help in the work.

Software distributions will include the earlier conference tapes, should be done on a 2-3 week turnaround from receipt of order, will be sent out only on new tapes, at a cost of \$20-35 per tape (tape + handling + mailing).

To become a member, send \$10. US to:

Login West
PO Box 581
Menlo Park
California 94025

Speaker 39

Interactive Image Processing

Rex Tracy
TASC

TASC is working in areas of image processing, including mapping, geodesy, charting, navigation, image data extraction, geothermal sources, mensuration, remote sensing and oceanographic imaging. They are in the business of evaluating architectures and algorithms for use in these areas. They have an image processing language under UNIX PWB, which they will be moving to a VAX. Their system uses an FPS AP-120B array processor.

Rex showed slides of images in various stages of enhancement, including the creation of elevation contours, gravity anomaly fields, edge enhancement, and localized histogram equalization within a user-sketched area. He also showed images on which an automatic classifier had been applied, to separate regions of river, city, forest, and other vegetation. A primary motivation in this work is to prepare images in such a way as to aid human photo interpreters to do their job.

He went on to present a digital imagery database over a small region, built up of a photo, map, railroads, transmission lines, and cultural information.

The graphics tools they are using are apparently public domain (they obtained them from another site), but the image processing code will probably not be distributed.

Speaker 40

Interactive Graphics in Pharmacology

Tom Ferrin
University of California at San Francisco

Tom's work is intended to support research into rational drug design, which they hope can replace simple discovery of new drugs. This effort requires some understanding of the interaction of complex molecules with human tissues, the computer graphics lab provides a means by which researchers can interact with molecular models containing 10,000 individual atoms. To perform the same task with physical models would require tons of modelling materials. Details of their work can be found in the winter issue of the journal 'Computer Graphics', a publication of the ACM SIGGRAPH.

The specific tools which support these efforts include:

A graphics subroutine package for the E&S Picture System 2, a beam-penetration, stroke-writing system costing \$50,000+.

Modifications to support one real-time process. Before the mod's, average time to wake this one proc up was 30-40 ms, with a worst case of 120ms. Now it is 5ms average, 20ms worst case. To do this, the proc is locked in core (preferably at the high end), and long kernel modules like mvcore are changed so as to be pre-emptible when the real-time proc needs to be scheduled.

Support for a variable number of subroutine arguments within separate I&O space programs. This involves a mod to the 11/70 processor, and has been documented in one of the older newsletters.

Fast I/O, using raw contiguous files.

Tom screened a film which they made straight off the face of their display station, showing their interactive tools in use. The particular molecules being handled in the demo were a large transport molecule being used to carry a smaller growth hormone, as might be used in the treatment of premature babies. Tom indicated that the 3D vector data is passed through the matrix hardware twice, once to display it, and once to calculate the intermolecular bond distances, which are display continuously as dashed lines, and numerically. The hardware supports hitler and yon clipping planes, which allow the user to limit the view of the molecules to an area of interest partway down their total depth.

Tom agreed to send out the mod's he has made to UNIX.

Speaker 41

Speaking Terminal for Blind Programmers

Ronald A. Morford
Drug Enforcement Administration

About a year and a half ago, industry had yet to provide adequate tools for blind persons to use computers; braille terminals suffer from low reliability, due to their mechanical nature. Ron set out to develop his own voice output terminal, called VERT (VERbal Terminal). VERT is an 8080-based unit which is placed on the tty line between host and standard terminal. It holds 16KB of PROM for the rules of pronunciation (after McIlroy's techniques) and user interface, plus 4KB of RAM for buffers. Information is buffered, and spoken using a Radio Shack VOIRAX voice synthesizer. Ron has the unit running at about 90-100 words per minute, his goal is 300 WPM, but not with this hardware configuration.

The user can operate VERT in a variety of modes. One key at a time input mode can be used for echo, and to determine variations in keyboard layout (hunting). Word at a time has normal uses, while no echo on input is used for entering large amounts of text. Output modes vary as well, depending on the content. The unit can be set to buffer a character at a time, word, line, or paragraph. It has been

taught a mode in which it understands programming statements, and will present programming elements more explicitly to avoid ambiguity.

Ron played a tape of some typical interactions, and indicated that he concentrates on writing code which 'sounds' good. Other programmers' code is often hard to understand when spoken. He feels strongly that any blind person who can use such a system should be given access to one, and universally, government and industry should be doing it. There is a company which is developing and selling VERT 3000 terminals, for about \$5,000.

Automated Functions
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Ron's talk was followed by a number of questions and comments. There are other groups developing tools for the handicapped, and one unmet need is for a portable note-taking system.

FRIDAY FEBRUARY 1, AFTERNOON SESSION

Chairperson -- Ed Szurkowski

Speaker 42

Summary of Tuesday Software Tools Meeting

Debbie Scherrer
Lawrence Berkeley Lab.

Debbie presented a brief summary of the Software Tools Meeting. She also presented an amusing quote attributed to R. Rewh from NYU:

"The day to day travails of the IBM programmer are always so amusing to those lucky enough to have never been one -- like watching Charlie Chaplin cook a shoe."

Speaker 43

TTY Handling

Dan Franklin
BBN

BBN has an extended terminal driver. It allows settable control characters, a polite mode in which incoming messages are interleaved with keyboard activity, deferred echo, 8 bit mode, page length parameterization, and so on. The code can be distributed if there is sufficient interest. The question was raised as to what terminal control character conventions people use. Roughly 30% of the audience uses the original Bell conventions, 30% have following the DEC standard, and 40% are using something else.

Speaker 44

Putting up UNIX when you don't know much

Robert A. Morris
University of Massachusetts, Boston

Robert presented a brief history of the evolution of his new UNIX system. His conclusions were that new sites should seek some help from within the UNIX community, and that having a friendly site which will make a bootable copy of your system media is a big help.

Speaker 45

STDPLT: A Device-Independent Plotting Package

John Nickolls
Ampex Corp.

John described an output-oriented device-independent plotting subroutine package which they have developed. The package will be on the upcoming 4th distribution tape.

Speaker 46

Two LSI Layout Tools

Robert Mathews
Ampex Corp.

Bob described tools they have developed for LSI layout design, which relate well to courses based on the book "Introduction to VLSI Systems", by Mead and Conway (Addison-Wesley 1980). The user passes layout commands from RATCIF through CIF to a plotting routine called PEN, which draws the layouts. Different dot patterns are used to display rectangular regions at various layers in an LSI circuit; these stipple patterns are chosen so that even when overlaid, it is possible to identify underlying layers. The system produces raster output, and can be used with Gould and Versatec plotters.

Speaker 47

SCANARGS: A Command-Line Argument Scanner

Gary Newman
Ampex Corp.

In the collection of tools in the UNIX system, there exist a number of different conventions for the expression and parsing of command arguments. The motivation for the SCANARGS subroutine which Gary has developed is to improve the human interface to these tools by encouraging uniformity of argument syntax, while allowing clean recovery from errors in argument lists, and allowing this code to be shared. Thus, 'usage: ...' messages will be handled automatically from the format description passed in scanargs().

The subroutine call looks like:

```
scanargs(argc,argv,format[,pointer]...);
```

where elements in the format are similar to those in printf and scanf. The usual '%' character indicates that an argument is optional, while using ':' indicates a required argument. For example, the syntax for diff is

```
diff [-h] [-efh] file1 file2
```

for which the call to scanargs would be

```
scanargs(argc,argv,"diff %h -efh %s %s %s",
           &blank,&flags,&file1,&file2);
```

Briefly, this means b is an optional flag to be stored in blank, a second set of up to 3 optional flags should be stored in flags, and the file names (required) should be stored in two string areas.

This facility is based on STDIO, and will be on the 4th distribution tape. Dennis Ritchie commented that there is a similar package in use at Bell Labs, and agreed that this is an important area of discussion, which will be continued in the Newsletter.

Speaker 48

Block Notes in UNIX Filesystems

Joe Yao
Science Applications Inc.

Joe described a situation he encountered on his system, in which a directory had grown in size to the point where its size had overflowed. Thus it has reached 'critical mass', and files placed in it simply disappeared. His attempts to find or remove the collection of files in that directory failed, although the filesystem space was indeed allocated. Rather than take the system down long enough to patch the problem, he decided to try to patch it online -- which he did successfully. His talk led to an animated discussion of a variety of similar situations which can arise, and how they should be controlled.

Speaker 49

Initiation to Join an Informal International UNIX Network

James Ellis
Duke University

People at Duke, and at the University of North Carolina, Chapel Hill, are forming an informal UNIX net, in which they are inviting participation. It will, at least initially, be based upon the uucp code from V7, plus modified mail and news programs. The architecture of the network was not spelled out, although it would appear that it will initially be a star, with Duke at the center. For information, contact

James Ellis
Dept. of Computer Science
Duke University
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(919) 684-3048

Speaker 50

Disc Scheduling AND V7 on a Z8000

John Bass
Onyx Systems

There are at least four general techniques which can be applied to disc scheduling in disc drivers: FIFO, sort the requests in the IN direction, sort them in the OUT direction, and sort them in IN and OUT, depending which way the disc heads are moving. John suggested that read-ahead will work well only with IN ordering, and that IN ordering is preferable for that reason. The norm in UNIX drivers is IN and OUT ordering.

Onyx has developed a table top Z8000 system which runs V7 UNIX. It is available with a binary licence, plus language processors for C, Pascal, Fortran, Basic, and Cobol. He suggests that its speed may be comparable to an 11/45 with DZ11 and RP04, plus or minus 20%, depending on the application. It now supports 512KB main memory on an 8 user system, with 10MB disc, at \$21,700 for the machine, \$2500 for the V7 binary. Single user systems should be available for about \$20,000, and peripheral improvements are on the way.

Speaker 51

C on the M68000

Charles Fursberg
Sidercal Inc.

Sidercal is involved primarily in the development of microprocessor based terminals for use with TWX, etc. These are M6800 and M68000 based, and they have ported the Ritchie C compiler to the M68000. Their assembler is based on the University of Queensland 6800 assembler. There is, of course, some question as to the relative merits of the M68000 and the Z8000; Charles prefers the M68000, in part because it supports a 32 bit address space. A test program in C which took 96 bytes, and 4.3 seconds on an 11/45, took 114 bytes, and 5.1 seconds on the M68000. They will be marketing this C compiler, although the price is not yet known.

All sessions ran close enough to the correct time that no Saturday session was required.

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Thompson	Carolyn Thompson	Johns Hopkins Applied Physics Lab	Ying	David Yost	Barclay International
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